

A Comparative Analysis between Experts and Novices Interacting with a Virtual Patient with PTSD

Patrick G. KENNY^{a,1}, Thomas D. PARSONS^a and Albert RIZZO^a

^a*Institute for Creative Technologies, University of Southern California, Marina Del Rey, CA 90292, USA*

Abstract. Virtual patients will provide a means to train the next generation of clinical residents. Interacting and engaging with virtual characters portraying standardized patients can have meaningful outcomes. As a cumulative set of data analysis, we investigate the comparison of how well novices, subjects without any clinical interviewing background, with experts, clinicians, or resident student clinicians with interviewing skills to assess if they could elicit the proper information from verbal interactions with a virtual character.

Keywords. Virtual Patient, Artificial Intelligence, Psychology

Introduction

Interactive Virtual Standardized Patients (VP) can provide meaningful training and development for clinicians, psychiatry residents, and medical students. These VP's portray embodied conversational characters with realistic representations of a mental or physical problem to be diagnosed or discussed. Our development of VP's involves advanced technologies that allow them to listen, act, and generate the appropriate verbal and non-verbal behavior for a particular presentation of a clinical issue. There have been numerous projects and studies building and evaluating virtual patients [1-3] for medical and psychological diagnosis, however more data metrics are required to fully understand how to build and use them.

This research presents the results of a study comparing novices and experts interacting with a virtual patient with Posttraumatic Stress Disorder (PTSD). Novices as being defined as test subjects that do not have any formal clinical interviewing or medical experience, and experts are being defined as resident clinicians or medical students. This work is a continuation of the virtual patient research developing and evaluating "Justina" [4] a virtual patient that suffers PTSD from a sexual attack. The initial subject testing of "Justina" was with psychiatry residents, and medical students and the goal of that study was to find out if the subjects could elicit the proper responses to make a diagnosis from a virtual patient system during a 15 minute interview. For this project we performed the same test as with the experts but this time using novices and wished to compare their interaction with how the experts performed. We wished to evaluate to see if the topics and questions the novices asked would

¹ Corresponding Author: E-mail: kenny@ict.usc.edu

naturally cover the categories and criteria of PTSD as defined in the DSM-IV manual or if the experts performed better in this task. Additionally, we were interested in what topics they did inquire about if they did not ask about the PTSD criteria.

The results of this experiment will assist in creating more engaging and realistic interactive virtual patients by expanding the domain of topics for the character and in understanding the differences between novices and experts. Additionally, this is an initial attempt to create a system for novices and experts alike that can help train or teach the proper way to interview a patient, or which topics should be discussed during an interview for a virtual patient with PTSD. As far as we know, this kind of comparison of experts and novices has not been performed with virtual patients with psychological issues.

1. Methods

The setup of the subject testing for the novice subjects was exactly the same as conducted with the experts, except that it was performed at the Institute and not at the USC Keck School of Medicine. The software system and “Justina” virtual patient were the same in all subject tests so as to keep the system consistent, even though the system could have been improved based on the testing with the experts. The subjects were videotaped as they performed the interview for later analysis of their non-verbal behavior, gaze, and interaction with the VP.

The subject testing method consisted of a set of pre-tests and questionnaires that were filled out electronically, followed by a 15-minute speech based verbal interaction with the virtual patient character, this was followed by an additional set of post questionnaires. The pool of subjects considered as novices consisted of staff, interns, and students from USC and The Institute for Creative Technologies. Several of the subjects were more computer savvy and had a deeper understanding of the technology underlying the virtual patient than the expert resident clinician subjects. There were 9 total subjects, 3 female and 6 male. All spoke in English; however there was 1 German and 1 Indian accent. This was compared against the 15 experts from the previous study.

2. Results

The data for the 9 novices was compared to that of the 15 experts in the previous study. The results showed that the subjects were not able to elicit the same information, as defined by the PTSD criteria in the DSM, as the expert clinicians during the 15-minute interview. There were many times when there were long pauses where the subjects searched their minds as to what they should be asking. Others understood that this was kind of like a game and attempted to game the system by asking questions in wrong ways or with just using single words. Not all of them treated it as seriously as the experts, partially because they have used systems like this in the past or wanted to explore the edges of the system. The data that will be presented and described in more detail will consist of the number and types of questions asked, the topics covered and a comparison of the experts results with the novice results. The questions asked by the subjects are classified into one of six categories dealing with the DSM PTSD criteria, such as the traumatic event, flashbacks, duration, and symptoms. Additionally, there was a category for general questions dealing with building rapport or clarification.



Figure 1. Virtual Patient Subject Testing Setup

There were more questions in the rapport category for the novices than for the experts, which meant they were asking questions about general things and not specific criteria to help make a differential diagnosis. The novices kept revisiting the same topic and questions more than the experts.

3. Conclusions

This was an initial study comparing a set of novices with a set of experts in their interaction with a virtual patient. The results yielded useful information in terms of the topics and set of question/response ratios for each of the DSM criteria needed for differential diagnosis of a virtual patient with PTSD. These results will help to improve the system and provide input into ways to more accurately guide a novice or expert user into asking the proper questions to build a more effective teaching tool. It was anticipated that the novices would not do as well as the experts; however, this was one of the first comparative analysis between novices and experts for virtual patients in the psychological domain.

References

- [1] P. Kenny, T.D. Parsons, J. Gratch, A. Leuski, and A.A. Rizzo, Virtual Patients for Clinical Therapist Skills Training. *Lecture Notes in Artificial Intelligence*, Intelligent Virtual Agents, Paris, 2007, pp. 197-210.
- [2] K. Johnsen, A. Raij, A. Stevens, D. Lind, and B. Lok, The Validity of a Virtual Human Experience for Interpersonal Skills Education. Proceedings of the SIGCHI conference on Human Factors in Computing Systems, ACM Press, New York, NY, 2007, pp. 1049-1058.
- [3] R.C. Hubal, P.N. Kizakevich, C.I. Guinn, K.D. Merino, and S.L. West, The Virtual Standardized Patient: Simulated Patient-Practitioner Dialog for Patient Interview Training, *Studies in Health Technology and Informatics* **70** (2000), 133-138.
- [4] P. Kenny, T.D. Parsons, C.S. Pataki, M. Pato, C. St-George, J. Sugar, and A.A. Rizzo, Virtual Justina: A PTSD Virtual Patient for Clinical Classroom Training, *Annual Review of CyberTherapy and Telemedicine* **6** (2008), 113-118.